WE CLAIM:

1. A communications system comprising:

a piping structure comprising a first location, a second location, and an electrically conductive portion extending between said first and second locations, wherein said first and second locations are distally spaced along said piping structure;

a first communication device electrically connected to said electrically conductive portion of said piping structure along said first location, said first communication device being adapted to send and receive communication signals via time-varying current;

a second communication device electrically connected to said electrically conductive portion of said piping structure along said second location, said second communication device being adapted to send and receive communication signals via time-varying current; and

an induction choke located about a portion of said piping structure, said induction choke being adapted to route time-varying current within said piping structure, and such that said first communication device can communicate with said second communication device via said piping structure.

2. A communications system in accordance with claim 1, wherein said induction choke comprises a ferromagnetic material.

3. A communications system in accordance with claim 1, wherein said induction choke is unpowered.

4. A communications system in accordance with claim 1, wherein said induction choke is generally toroidal shaped and is generally concentric about said piping structure.

5. A communications system in accordance with claim 4, wherein said choke is generally cylindrical shaped having a generally cylindrical borehole formed therethrough.

6. A communications system in accordance with claim 1, wherein said induction choke is substantially electrically insulated from said piping structure.

7. A communications system in accordance with claim 1, wherein said time-varying current is an alternating current.

8. A communications system in accordance with claim 1, wherein said first and second communication devices are adapted to send and digital broadband communication signals.

9. A communications system in accordance with claim 1, wherein said first communication device is part of a computer system, said computer system being adopted to process communication signals received from said second communication device via said piping structure and said first communication device.

10. A communications system in accordance with claim 1, wherein at least a portion of said piping structure is within a petroleum well.

11. A communications system in accordance with claim 10, wherein said second location extends downhole, and

wherein at least a portion of said first location is between said second location and the surface.

12. A communications system in accordance with claim 10, wherein said first location is downhole, and said second location is part of a lateral branch of said well.

13. A communications system in accordance with claim 10, wherein said piping structure comprises at least a portion of a production tubing string.

14. A communications system in accordance with claim 10, wherein said piping structure comprises at least a portion of a well casing.

15. A communications system in accordance with claim 10, wherein said piping structure comprises at least a portion of a liner for a lateral branch of said well.

16. A communications system in accordance with claim 1, wherein said induction choke is located along said first location.

17. A communications system in accordance with claim 1, including a plurality of devices electrically connected to said electrically conductive portion of said piping structure, wherein said devices are operable to communicate with each other.

18. A communications system in accordance with claim 1, including a plurality of devices electrically connected to said electrically conductive portion of said piping structure, wherein a number of said devices are individually addressable.

19. A communications system in accordance with claim 1, further comprising:

an electrical current transformer adapted to transform current flowing within said piping structure to an induced secondary current.

20. A system for providing communications among a plurality of devices in a well, comprising:

a piping structure within said well, said piping structure having an electrically conductive portion;

a master communication device electrically connected to said electrically conductive portion of said piping structure, said master communication device being adapted to send and receive communication signals via time-varying current;

a plurality of slave communication devices electrically connected to said electrically conductive portion of said piping structure, said slave communication devices being adapted to send and receive communication signals via time-varying current; and

an induction choke located about a portion of said piping structure, said induction choke being adapted to route time-varying current within said piping structure, and such that said master communication device can communicate with said slave communication devices via said piping structure.

21. A system in accordance with claim 20, wherein at least two of said slave communication devices can communicate with each other via said piping structure.

22. A system in accordance with claim 20, wherein at least two of said slave communications devices are individually addressable.

23. A communications system comprising:

a piping structure comprising a first location, a second location, and an electrically conductive portion extending between said first and second locations, wherein said first and second locations are distally spaced along said piping structure;

a first communication device electrically connected to said electrically conductive portion of said piping structure along said first location, said first communication device being adapted to send and receive communication signals via time-varying current;

an induction choke located about an electrically choked portion of said electrically conductive portion of said piping structure, said induction choke being adapted to route time-varying current within said piping structure between said electrical connection location for said first communication device and an electrical return;

an electrical current transformer located about part of said electrically conductive portion of said piping structure along said second location, said transformer being located along said piping structure between said electrical connection location for said first communication device and said induction choke, and said transformer being adapted to transform current flowing within said piping structure to an induced secondary current in said transformer; and

a second communication device electrically connected to said transformer, such that said second communication device can communicate with said first communication device via said transformer and said piping structure.

24. A communication system for a petroleum well, comprising:

a piping structure comprising a first location, a second location, and an electrically conductive portion extending between said first and second locations, wherein said first and second locations are distally spaced along said piping structure, and wherein said piping structure is part of a petroleum production system for said petroleum well;

a computer system electrically connected to said electrically conductive portion of said piping structure along said first location, said computer system comprising a source of time-varying current and a first communication device, wherein said first communication device is adapted to send and receive spread spectrum communication signals along said electrically conductive portion of said piping structure via time-varying current waveforms;

a downhole device electrically connected to said electrically conductive portion of said piping structure along said second location, said downhole device comprising a second communication device, wherein said second communication device is adapted to send and receive spread spectrum communication signals along said electrically conductive portion of said piping structure via time-varying current waveforms; and

an unpowered ferromagnetic induction choke located about an electrically choked portion of said electrically conductive portion of said piping structure, said choke being adapted to route time-varying current flowing within said electrically conductive portion of said piping structure between said computer system and said downhole device, and such that said first communication

device can communicate with said second communication device via said electrically conductive portion of said piping structure.

25. A communications system in accordance with claim 24, wherein said downhole device comprises a sensor, said sensor being adapted to take measurements and generate sensor data, said computer system being adapted to process said sensor data received from said first communication device via said second communication device.

26. A communications system in accordance with claim 25, wherein said sensor is adapted to measure fluid temperature.

27. A communications system in accordance with claim 25, wherein said sensor is adapted to measure fluid flow rate.

28. A communications system in accordance with claim 25, wherein said sensor is adapted to measure pressure.

29. A communications system in accordance with claim 25, wherein said sensor is adapted to acoustically measure pool depth.

30. A communications system in accordance with claim 25, wherein said sensor is adapted to measure a valve position.

31. A communications system in accordance with claim 25, wherein said sensor is adapted to detect a chemical property of a fluid.

32. A communications system in accordance with claim 24, wherein said downhole device comprises an electrically controllable valve.

33. A communications system in accordance with claim 32, wherein said valve comprises a low current electric motor.

34. A communications system in accordance with claim 24, wherein said downhole device comprises a electrical current transformer.

35. A communications system in accordance with claim 24, wherein said downhole device comprises multiple components electrically connected together.

36. A communications system in accordance with claim 24, wherein said downhole device comprises a battery.

37. A petroleum well for producing petroleum products, comprising:

a piping structure comprising a first location, a second location, and an electrically conductive portion extending between said first and second locations, wherein said first and second locations are distally spaced along said piping structure;

a first communication device electrically connected to said electrically conductive portion of said piping structure along said first location, said first communication device being adapted to send and receive communication signals via time-varying current;

a second communication device electrically connected to said electrically conductive portion of said piping

structure along said second location, said second communication device being adapted to send and receive communication signals via time-varying current; and

an induction choke located about an electrically choked portion of said electrically conductive portion of said piping structure, said induction choke being adapted to route time-varying current within said piping structure between said electrical connection location for said first communication device and said electrical connection location for said second communication device, and such that said first communication device can communicate with said second communication device via said piping structure.

38. A petroleum well in accordance with claim 37, wherein said induction choke comprises a ferromagnetic material.

39. A petroleum well in accordance with claim 37, wherein said induction choke is unpowered.

40. A petroleum well in accordance with claim 37, further comprising:

a controllable valve, said controllable valve being electrically connected to said second communication device such that said valve can be remotely controlled via said second communication device.

41. A method of communicating with a remote device, comprising the steps of:

providing an induction choke about a portion of a piping structure;

generating a communication signal with a first communication device;

transmitting said signal via a time-varying current along said piping structure using said first communication device;

routing said time-varying current within said piping structure using said induction choke; and

receiving said signal in said remote device via said time-varying current traveling within said piping structure.

42. A method in accordance with claim 41, wherein said communication signal is a spread spectrum signal.

43. A method of communicating with a downhole communication device in a well, comprising the steps of:

providing an induction choke about a portion of a piping structure in said well;

generating a spread spectrum signal with a surface communication device;

transmitting said signal via a time-varying current along said piping structure using said surface communication device;

routing said time-varying current within said piping structure using said induction choke; and

receiving said signal in said downhole communication device via said time-varying current traveling within said piping structure.

44. A method in accordance with claim 43, further comprising the steps of:

receiving said signal with a relay communication device located along said piping structure between said surface communication device and said downhole communication device;

amplifying said signal with said relay communication device; and

transmitting said signal along said piping structure using said relay communication device.

45. A method in accordance with claim 43, further comprising the steps of:

generating another spread spectrum signal with said downhole communication device;

transmitting said another signal via another time-varying current along said piping structure using said downhole communication device;

routing said another time-varying current within said piping structure using said induction choke; and

receiving said signal in said surface communication device via said piping structure.

46. A power distribution system comprising:

a piping structure comprising a first location, a second location, and an electrically conductive portion extending between said first and second locations, wherein said first and second locations are distally spaced along said piping structure;

a first device electrically connected to said electrically conductive portion of said piping structure along said first location, said first device being adapted to use a time-varying current;

a second device electrically connected to said electrically conductive portion of said piping structure along said second location, said second device being adapted to use a time-varying current; and

an induction choke located about a portion of said piping structure, said induction choke being adapted to route time-varying current within said piping structure,

and such that said first device and said second device are operable using a time-varying current applied to said piping structure.

47. A power distribution system in accordance with claim 47, wherein said induction choke comprises a ferromagnetic material.

48. A power distribution system in accordance with claim 47, wherein said induction choke is unpowered.

49. A power distribution system in accordance with claim 47, wherein said induction choke is generally toroidal shaped and is generally concentric about said piping structure.

50. A power distribution system in accordance with claim 47, wherein said choke is generally cylindrical shaped having a generally cylindrical borehole formed therethrough.

51. A power distribution system in accordance with claim 47, wherein said induction choke is substantially electrically insulated from said piping structure.

52. A power distribution system in accordance with claim 47, wherein said time-varying current is an alternating current.

53. A power distribution system in accordance with claim 47, wherein at least a portion of said piping structure is within a petroleum well.

54. A power distribution system in accordance with claim 54, wherein said second location extends downhole, and wherein at least a portion of said first location is between said second location and the surface.

55. A power distribution system in accordance with claim 54, wherein said first location is downhole, and said second location is part of a lateral branch of said well.

56. A power distribution system in accordance with claim 54, wherein said piping structure comprises at least a portion of a production tubing string.

57. A power distribution system in accordance with claim 54, wherein said piping structure comprises at least a portion of a well casing.

58. A power distribution system in accordance with claim 54, wherein said piping structure comprises at least a portion of a liner for a lateral branch of said well.

59. In a petroleum well having a piping structure embedded in an elongated borehole extending into the earth, a communication system comprising:

an induction choke configured for enveloping a portion of said piping structure and operable for developing a voltage potential on the piping structure to define an electrically conductive segment of said piping structure when a time-varying signal is applied to the electrically conductive segment of said piping structure; and

a plurality of individually addressable communication devices coupled to the electrically conductive segment.

60. The communications system of claim 60, including a plurality of induction chokes with a communication device associated with a number of said induction chokes, the associated communication devices including a router whereby the time-varying signal may be routed to selectively bypass an associated choke.